Response to EPA Comments on the Draft Pre-Design Investigation Work Plan, dated September 14, 2020

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
G1	WP	General	**Contaminants of Concern:** The PDI WP focuses on Portland Harbor Superfund Site (PHSS) Record of Decision (ROD) Table 21 focused Contaminants of Concern (COCs) and excludes the additional contaminants on Table 21. Per the ROD, sediment management areas (SMAs) are defined by the presence of contaminated sediment above remedial action levels (RALs) and principal threat waste (PTW) thresholds established in ROD Table 21; therefore, EPA expects characterization of all Table 21 contaminants for SMA refinement unless a technical rationale based on the project area conceptual site model (CSM) can be provided to exclude characterization of Table 21 additional contaminants. Revise all applicable sections of the PDI WP accordingly. Additionally, the PDI WP is not clear on how, or if, the ROD Table 17 cleanup levels (CULs) will be integrated into the remedy design process. For clarification, performance standards are not limited to the Table 21 RALs, and the PDI WP should identify where in design ROD Table 17 CULs will be evaluated for and applied to proposed remedial design (RD) methodologies.	The work plan will be revised to include all Table 21 Contaminants (focused COCs and additional contaminants including chlorobenzene) used to determine horizontal and vertical extent. Table 17 CULs will be used to identify clean sediments and as performance standards for remedial design.
G2a	WP	General	**River bank Concerns:** EPA has the following general concerns for the river bank. a. The Arkema Project Area includes the GS roofing site which is listed in the ROD as a river bank of known contamination and a site with unresolved groundwater source control evaluation (SCE) issues. The Oregon Department of Environmental Quality (DEQ) Source Control Decision (SCD) deferred unresolved issues to the Administrative Settlement Agreement and Order on Consent (ASAOC) work and it needs to be addressed in this PDI WP.	Acknowledged; Section 1.2 of the work plan will be revised to note GS Roofing information and conditions.
G2b	WP	General	b. The Arkema river bank needs to be characterized for chlorobenzene contamination under the PDI. The PDI WP states that: chlorobenzene is not expected to be present in surface and near surface river bank soil, the river bank has not been tested for chlorobenzene, and no additional river bank sampling for chlorobenzene is planned. Industrial processes associated with the dichlorodiphenyltrichloroethane (DDT) manufacturing or placement of dredge spoils as fill may have resulted in chlorobenzene contamination of the river bank. EPA expects the extent of chlorobenzene in river bank and sediment to be delineated under the PDI or a CSM-based rationale for excluding chlorobenzene must be provided. See PDI WP General Comment 1 on Contaminants of Concern.	Chlorobenzene will be added to the riverbank soil testing suite. Section 3.2 of the work plan will be revised to clarify that additional testing will be performed as part of the PDI in order to confirm this aspect of conditions adjacent to the Arkema site.
G2c	WP	General	c. As outlined in EPA's *Guidance for River Bank Characterizations and Evaluations at the Portland Harbor Superfund Site* (RBG), the full extent of the river bank should be characterized for ROD Table 17 CULs. Areas with contaminant migration to the river (e.g., river bank erosion or leaching of contaminants to the river) will require action to meet the protectiveness remedial action objectives (RAOs) of the PHSS remedy. Previous river bank sampling appears to be based on ecological risk study questions, but locations are not sufficient for characterizing river bank for remediation under the ROD. It is unclear why the proposed river bank sampling is limited to the southern end of the Arkema Project Area. Additional samples providing greater spatial coverage of the entire river bank must be incorporated into the PDI to address this data gap.	The scope of riverbank sampling will be revised as shown in a new figure to provide greater spatial coverage of the entire riverbank. Another figure will be added to show locations of historical riverbank sampling in comparison to new locations proposed in the work plan.

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G2d	WP	General	d. Include undocumented fill as a primary source of contamination in the CSM based on historical use of fill to build the nearshore upland and river bank at the Arkema Project Area. Episodes of fill are mentioned in the PDI WP but not identified as a potential source.	Section 1.3.2 of the Work Plan will be revised to acknowledge the historical use of fill on the bank. However, we respectfully disagree that riverbank fill is a primary source. Consistent with ROD Figure 5, riverbank fill would be considered a secondary source. Potential contamination in the fill originated elsewhere prior to placement on the riverbank.
G3	WP	General	**Performance of Source Control Measures**: Summary and analysis of performance monitoring data needs to be included in the PDI WP to support the presumption that the stormwater and groundwater source control measures are preventing upland contamination from affecting the sediment.	Performance monitoring data for the stormwater SCM will be included in the work plan. LSS plans to implement a Groundwater Extraction Enhancement in 2021. The groundwater SCM will be modified over the next 1–2 years to increase its efficiency, and the sediment design will be updated accordingly. Current groundwater discharge conditions to the river will be assessed using seepage meters. Please see the response to work plan Comment S9 for additional details.
G4	WP	General	**Groundwater Contamination at Lots 1 and 2:** The PDI WP should expand on the assessment of groundwater contamination at Lots 1 and 2 to evaluate potential groundwater contamination related to the former DDT trench, dredge spoil fill, former asbestos trenches, and pond. DDx exceeds groundwater CULs in this area.	The work plan will be expanded to include the assessment of groundwater contamination on Lots 1 and 2. Current groundwater discharge conditions to the river will be assessed using seepage meters. Please note that DDx (as well as other contaminants) is a known COC in the Bayer trespass groundwater plumes. LSS assumes that Bayer will control its groundwater plumes prior to implementation of the sediment remedy.
G5	WP	General	**Appendix G:** The proposed approach of collecting 2,3,4,7,8-PeCDF (PeCDF) data to represent all PCDD/Fs at the RM 7W area is inconsistent with the ROD and should be removed from the PDI WP. The ROD requires SMAs to be delineated based on characterization of all Table 21 contaminants. Additionally, PCDD/F analysis techniques have improved substantially since most of the Portland Harbor Remedial Investigation and Feasibility Study data was collected and therefore the correlations between PeCDF and the other PCDD/Fs presented in Appendix G are not likely to be representative of current conditions and need to be evaluated using RD data. EPA acknowledges the discrepancy identified between FS Appendix B and Appendix J; however, that is not an acceptable reason to deviate from ROD requirements to characterize all Table 21 contaminants.	All Table 21 contaminants will be addressed by the revised sediment sampling program. See also response to General Comment 1. Thank you for acknowledging the discrepancy between FS Appendix B and Appendix J. The correlations between PeCDF and the other PCDD/Fs presented in Appendix G will be reevaluated using RD data that establish current conditions.

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G6	WP	General	**Future Marine Operations:** The PDI WP indicates that the three Arkema docks are no longer in use and will be removed as part of the remediation efforts. The Arkema facility is zoned river-dependent use. The PDI WP should identify how marine operations are anticipated to be maintained at the Arkema property and associated design data requirements.	The existing docks are not "Currently Operating or used to stabilize the bank"; so existing docks will be removed consistent with ROD Figure 28, Technology Application Decision Tree. There are no ongoing or currently planned future marine operations at the Arkema site. If future site operations require marine facilities, new facilities would be designed and constructed at that time. This is consistent with the current zoning for the Arkema site, IHik, which allows for river-dependent or river-related industries. *NOTES: Zoning is IHik* **Heavy Industrial (IH)** The IH zone provides areas where all kinds of industries may locate, including those not desirable in other zones due to their objectionable impacts or appearance. **River Industrial (i)** The River Industrial **(i)** overlay zone encourages and promotes the development of river-dependent and river-related industries which strengthen the economic viability of Portland as a marine shipping and industrial harbor, while preserving and enhancing the riparian habitat and providing public access where practical. **Prime Industrial (k)** The Prime Industrial **(k)** overlay zone limits new parks, open areas and commercial outdoor recreation; prohibits self-service storage and major event entertainment uses; and prohibits future quasi-judicial Comprehensive Plan Map amendments. This overlay preserves Portland's limited supply of prime industrial land for industrial use. https://www.portlandmaps.com/bps/zoning/#/zones/
S1	WP	Section 1.2.1 Site Description, page 1-3, 3rd Paragraph	Update the text to include polyaromatic hydrocarbons (PAHs) as contaminants detected in river bank soil.	Section 1.2.1 of the work plan will be revised as requested.
S2	WP	Section 1.1 Record of Decision and Technology Tree, Figures 1-3a-b	These figures do not differentiate between RAL and PTW exceedances. Differentiating RAL and PTW exceedances and identifying which COCs exceed would support the sediment sampling location proposal. Add this information to the figures.	Figures 1-3a-b will be revised to differentiate between RAL and PTW exceedances and to show the COC(s) exceeded.
S3	WP	Section 1.2.2 Historical Operation Summary, page 1-4	The PDI WP should identify which "grass defoliant" was manufactured at the Arkema facility.	The work plan will specify that the grass defoliant material was manufactured at the Arkema site for a few months in the early 1950s. The operation consisted of chlorinating acetone with chlorine gas (Elf Atochem 1999). The specific name of the chlorinated acetone compound is unknown.
S4	WP	Section 1.3 Conceptual Site Model, pages 1-9 through 1-16	The CSM should be expanded to identify upland groundwater plumes which project to the Willamette River, including: the Bayer trespass plume, the DDx plume associated with the fill material on Lots 1 and 2, and the other volatile organic compounds (VOCs) (chloroform, etc.) and inorganic (chloride, perchlorate, metals etc.) plumes both behind and outside the groundwater barrier. These plumes are identified in the preliminary hot spot evaluation and supporting upland documents.	The work plan will be updated to include a discussion of these COCs.

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S5	WP	Section 1.3.1 Contaminant Sources, pages 1-9 through 1-13 and Figure 1-9	Relevant sections of the PDI WP, including Figure 1-9 CSM Diagram Dock 1 & 2 Reach, should be updated to include and depict the observed non-aqueous phase liquid (NAPL) riverward of the groundwater barrier wall and potential presence of manufacturing process residue (MPR) - related NAPL at the former process discharge pipe location. The conceptual contaminant release model presented in the PDI WP does not identify the presence of chlorobenzene NAPL associated with releases of MPR. The distribution of NAPL was mapped as part of the upland remedial investigation (RI) into the river bank outside of the barrier wall, and NAPL was found riverward of the groundwater barrier wall on/in the silt unit which separates the shallow and intermediate groundwater zones in the Acid Plant area. This information should be incorporated into the PDI WP. Additionally, during the offshore investigation, sheen, NAPL blebs and high concentrations of chlorobenzene were observed in the vicinity of the former process discharge pipe that is believed to have discharged MPR during the first year of DDT manufacture. The MPR discharged via floor drains in the former DDT manufacturing building may have contained NAPL and discharged to the river through the process discharge pipe. This potential transport pathway should be acknowledged in the PDI WP. This section also includes many unsupported statements regarding potential sources of contamination to the river and not all conclusions are consistent with EPA's understanding of conditions at Arkema. Provide references to support all conclusions presented in this section.	Figure 1-9 will be modified to include the residual NAPL identified near the top of the bank as reported in the Upland RI Report (ERM 2005) and Draft Acid Plant Area DNAPL Sampling Summary Report (ERM 2006). The presence of MPR at the former process discharge pipe has not been documented; however, the presence of dissolved-phase chlorobenzene and sheens in this area will be presented in the CSM Figure 1-9. The CSM will be revised to clearly associate the MPR with the chlorobenzene NAPL identified during the Upland remedial investigation. The presence and use of the Former Process Discharge Pipe is the first entry under the "Primary Sources" section of the PDI work plan. This section will be amended to include additional information on the content of potential discharges from this pipe during early DDT production. Where not already provided, references will be provided to support conclusions presented in this section. The text will be reviewed and any references that may have been missed will be added. Please let us know if there are any specific statements that need references and we will provide them.
S6	WP	Section 1.3.2 Transport Pathways, CSM, and Arkema Project Area Reaches, pages 1-13 through 1-16	Benzene and tetrachloroethene should be included as COCs and evaluated in the PDI. Section 2.7.4.1 states that these compounds exceeded toxicity characteristic leaching procedure (TCLP) limits in sediment samples collected from the Arkema Project Area. Revise this section accordingly.	The work plan will be updated to evaluate benzene and tetrachloroethene for waste characterization purposes. There are no Portland Harbor sediment CULs for these constituents.
S7a	WP	Section 1.3.2.1 Upstream Reach, pages 1-16 through 1-14	EPA has the following comments on this section and the text should be revised accordingly: a. Update text to include metals as COCs in river bank soil and sediment at the GS Roofing property, which is included in the Arkema Project Area upstream reach.	Section 1.3.2.1 will be revised to acknowledge metals present in historical samples collected in riverbank soil and sediment at the GS Roofing property.
S7b	WP	Section 1.3.2.1 Upstream Reach, pages 1-16 through 1-14	b. Perchlorate and chromium are groundwater COCs listed in ROD Table 17 and should be analyzed for in the groundwater and porewater samples. If Arkema does not intend to include perchlorate and chromium in analyses the discussion in this section should be expanded to provide data to support not evaluating perchlorate and chromium in RD.	The work plan will be updated to include the analysis of perchlorate and chromium in groundwater and porewater samples.
S8	WP	Section 1.2.3.1 Stormwater SCMs, page 1-5	Provide a comparison of recent stormwater analytical data to ROD CULs. The text states that there have been substantial reductions in DDT concentrations in stormwater, and any such reductions should be quantified relative to CULs.	The work plan will be updated to provide a summary of recent stormwater data compared to Portland Harbor ROD CULs.

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S9	WP	Section 1.2.3.2 Groundwater SCMs, page 1-5	The PDI WP, in a number of instances, characterizes the groundwater barrier wall and groundwater extraction and treatment (GWET) system as effective in preventing the migration of groundwater contaminants around or under the barrier wall to the river. The text should be revised to clarify that the GWET system is currently the focus of a DEQ-directed adaptive management program to establish hydraulic control of groundwater since monitoring has demonstrated that the current system has never achieved this objective. DEQ has concluded that sustainable pumping rates from the current extraction wells are substantially less then system design rates, and the existing groundwater extraction system is not likely capable of achieving or sustaining the required inward gradients. Migration of contamination around, and possibly under, the wall is an ongoing concern given the lack of hydraulic control. As noted in DEQ's August 20, 2020 comment letter to LSS on the 2020 GWET System Effectiveness Evaluation, the GWET system is unlikely to provide control of the upland source area prior to the implementation of the in-water remedial action and future submittals to EPA should acknowledge the failure of the GWET system to control upland sources to the river (DEQ, 2020). Revise text throughout the PDI WP as appropriate.	The GWET system is currently in a DEQ adaptive management program. LSS plans to implement Groundwater Extraction Enhancement in 2021 to achieve the Capture Zone Objectives. While the Capture Zone Objectives are not being consistently achieved by the current GWET system, it is influencing groundwater flow and reducing the migration of contaminants. Please note that we respectfully disagree that "…the GWET system is unlikely to provide control of the upland source area prior to implementation of the in-water remedial action… ." The Sufficiency Assessment is required as part of the in-water remedy and is a critical first step in the design and implementation of the in-water remedy. The Sufficiency Assessment will be completed as part of the Basis of Design Report after the in-water PDI has been completed. LSS expects to implement the Groundwater Extraction Enhancement and achieve the Capture Zone Objectives prior to the Basis of Design Report and Sufficiency Assessment. The work plan will be updated to evaluate groundwater discharge and to focus on the flux to the river and the assessment of concentrations of COCs in groundwater at the point of discharge using seepage meters, which is consistent with groundwater RAOs from the Portland Harbor ROD (RAOs 4 and 8). Details of the groundwater discharge approach are as follows: • Seepage meter station locations will be evaluated and expanded o Groundwater monitoring will be proposed in the final work plan at select locations near the top of the bank adjacent to the Arkema site in the first quarter of 2021, and the data will be used to refine and assess additional seepage meter locations. o The GS Roofing SCE data will be presented in the PDI work plan, to the extent available, and evaluated for data gaps. Seepage meter stations will be proposed in the work plan if data gaps are identified in this area to assess current flux conditions. o Bayer's recent (2018) groundwater data on Lots 1 and 2 and the riverbank area will be evaluated in the work plan. Seepage meter stations in the Lot 1 and 2 Reach will be proposed in the work plan to assess current flux conditions. • Seepage meters will be deployed in Q3 2021 when the river stage is low and the hydraulic gradient between the upland site and the river is maximized. • The groundwater and porewater samples will be analyzed for the groundwater COCs listed in Tables 17 and 21 of the Portland Harbor ROD. In addition to the ROD groundwater COCs, chloride and chloroform will be analyzed in groundwater and porewater samples in accordance with EPA's recommendations. Seepage meter data will be used to inform sediment cap design.

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S10	WP	Section 1.3.1.2 Secondary Sources, page 1-12	This section only discusses the Arkema chlorobenzene and DDx plume behind the groundwater barrier. There are additional COCs that exceed Portland Harbor CUL levels and Joint Source Control Strategy (JSCS) screening level values (SLVs) in the area behind the groundwater barrier and additional Arkema groundwater plumes outside the groundwater barrier as documented in the Preliminary Hot Spot Evaluation and supporting upland documents. A more complete summary of upland groundwater plumes should be included for all Table 17 COCs with groundwater CULs. Based on data from previous evaluations and information collected for the Joint Source Control Strategy (JSCS), discussion of chloroform and chloride should also be included,	The groundwater plume discussion in the work plan will be expanded to include all Portland Harbor COCs listed in Tables 17 and 21 of the ROD. The ROD groundwater COCs supersede the JSCS SLVs. A brief discussion of chloroform and chloride will also be provided in the final work plan.
S11a	WP	Section 1.3.2.1 Upstream Reach, page 1-14 and Figures 3-4 and 3-5	EPA has the following comments on this section and the text should be revised accordingly: a. The text states that groundwater plumes "… are largely controlled or are not of concern with respect to sediment cleanup because they are conservative tracers and do not sorb to sediments." The PDI WP should revise the discussion to include the locations and constituents in all known plumes. In addition, any groundwater plume discharging to the river must be evaluated in the RD process as part of sediment cap design. Simply because a constituent does not sorb to sediments does not mean that it may not affect biota in a discharge zone and can still impact the achievement of RAOs.	The discussion regarding contaminants acting as conservative tracers was specifically related to the sediment recontamination potential posed by these contaminants. The conservative contaminants will be analyzed in groundwater and sediment porewater samples and evaluated as part of the sediment remedial design process. As noted in the response to work plan Comment S10, all Portland Harbor groundwater COCs listed in Tables 17 and 21 of the ROD will be evaluated in the work plan.
S11b	WP	Section 1.3.2.1 Upstream Reach, page 1-14 and Figures 3-4 and 3-5	b. All groundwater contaminant plumes (perchlorate, chlorobenzene, chromium, etc.) should be shown on a map relative to the selected groundwater discharge study and porewater sampling locations. In addition, other deleterious groundwater impacts should be discussed and shown on Figures 3-4 and 3-5 (e.g., salts, pH, etc.). Previous information discussing the risks posed by these plumes should be summarized in the PDI WP to help evaluate requirements for additional sampling.	Please see the response to work plan Comment S10. A discussion of chloride and pH conditions in groundwater will also be added to the work plan.
S11c	WP	Section 1.3.2.1 Upstream Reach, page 1-14 and Figures 3-4 and 3-5	c. This section inaccurately states that groundwater plumes discharging to the upstream reach have been curtailed by installation of the groundwater barrier wall. The statement should be corrected (see Specific Comment on Section 1.2.3.2).	Please see the response to work plan Comment S9.
S11d	WP	Section 1.3.2.1 Upstream Reach, page 1-14 and Figures 3-4 and 3-5	d. This section states that Arkema treated hexavalent chromium and perchlorate in groundwater in the upstream reach. It is correct that Arkema implemented a groundwater treatment program for hexavalent chromium. However, the effectiveness monitoring program and evaluation for the need for additional in-situ treatment was not implemented with the decision to construct the groundwater barrier wall and GWET system. Therefore, the effectiveness of the program is unknown. A more complete summary of the upland groundwater plumes should be included as it relates to cap design.	Additional information on the groundwater treatment work conducted at the Arkema site prior to the construction of the groundwater barrier wall and GWET system will be added to the work plan. This information will be focused on any implications to sediment cap design.
S11e	WP	Section 1.3.2.1 Upstream Reach, page 1-14 and Figures 3-4 and 3-5	e. Arkema has not treated perchlorate in groundwater as stated in this section. Arkema did develop a draft field pilot plan to bioremediate perchlorate in-situ in upland groundwater; however, the groundwater barrier wall/GWET source control measure was pursued instead. The PDI WP should be updated to reflect this information.	LSS conducted a bench-scale study to evaluate the effectiveness of *in situ* anaerobic bioremediation to treat perchlorate in groundwater. Clarification will be added to the work plan.

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S12	WP	Section 2.1 Background, page 2-1, paragraph 4	The text states that historical data with detection limits above RALs and/or PTW thresholds will be excluded from use in remedial design. Clarify in the text if these data will only be excluded if the reported values are non- detect. If concentrations were detected, then the measurements should be included unless there is some other reason for excluding them.	The work plan text will be revised to state these data will only be excluded if the reported values are non-detect.
S13a	WP	Section 2.2 Use of RALs and PTW for Screening and Remedial Decision-Making, page 2-3	EPA has the following comments on this section and the text should be revised accordingly: Note that contaminants with RALs and PTW thresholds are found in Table 21 of the ROD, not Table 17 as stated in the text.	The work plan text will be corrected to indicate RAL and PTW concentrations are in ROD Table 21.
S13b	WP	Section 2.2 Use of RALs and PTW for Screening and Remedial Decision-Making, page 2-3	Discuss all ROD Table 21 contaminants. The text omits discussion of carcinogenic polycyclic aromatic hydrocarbons (cPAHs), chlorobenzene, and naphthalene.	The work plan text will be revised to include discussion of all ROD Table 21 contaminants.
S13c	WP	Section 2.2 Use of RALs and PTW for Screening and Remedial Decision-Making, page 2-3	It appears that LSS does not intend to characterize all PCDD/Fs based on the rationale provided in this section and in Appendix G. This is inconsistent with ROD requirements to characterize all Table 21 contaminants. See General Comment 5 regarding Appendix G.	LSS intends to characterize all PCDD/Fs. The language in this section will be modified in the work plan to make this clear. See also response to Comment G5 regarding Appendix G.
S14	WP	Section 2.3.5 Total PCBs, page 2-6	The statement that there are no known sources of polychlorinated biphenyls (PCB) contamination at the site is not consistent with the Arkema site history. Transformers containing PCBs were used at the Arkema site, supported by concrete pads. PCBs were detected in soil samples obtained from the area following transformer decommissioning and removal (ERM 2005d). The Bonneville Power Administration (BPA) operated an electrical substation on the property for a number of years with known use of PCB-contaminated boiler fuel. Revise the text to address this comment.	The work plan will be updated to include a discussion of PCB sources on the Arkema site, PCB concentrations in soil, and any potential pathways to the Willamette River.
S15	WP	Section 2.3.7 Chlorobenzene, page 2-6	The wording of this section is misleading and is not consistent with upland investigation conclusions. Revise the text to note that NAPL has been observed in river bank soil.	The wording in this section will be revised to be consistent with the upland investigation conclusions regarding chlorobenzene and NAPL.

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S16	WP	Section 2.5 NAPL, page 2-9	The text states "CDM Smith also based its finding of NAPL [nonaqueous-phase liquid] presence on a 1 percent solubility rule of thumb. The 1 percent solubility rule of thumb is not a definitive finding of NAPL; it is more typically used to screen initial sample data to determine if NAPL investigation may be warranted." Provide a citation for this statement, which appears to be at odds with Newell and Ross (2002), Cohen and Mercer (1993), and Pankow and Cherry (1996), all of which discuss the importance of organic analyses in NAPL site investigations. Definitive identification of NAPL by installing a well and assessing if there is NAPL accumulation is impossible at offshore locations; hence, less direct methods including chemical analysis are required.	We believe we are in agreement on the approach. Chemical analysis for chlorobenzene and other potential NAPL constituents will be added to the NAPL identification protocol in the revised PDI work plan. Also see LSS' summary of the September 30 meeting regarding NAPL delineation. LSS agrees that the identification of any NAPL in sediment offshore is difficult, so we are proposing a multiple lines-of-evidence approach, which is consistent with EPA guidance. Regarding the statement, "The 1 percent solubility rule of thumb is not a definitive finding of NAPL; it is more typically used to screen initial sample data to determine if NAPL investigation may be warranted," current EPA guidance is in agreement that a multiple lines of evidence approach is needed to establish the presence or absence of NAPL. For example, EPA's 2009 Ground Water Issue: Assessment and Delineation of DNAPL Source Zones at Hazardous Waste Sites by Bernard Kueper and Kathryn Davies states "This document builds on information…to provide a framework for not only assessing the presence of DNAPL, but also for delineating the spatial extent of the DNAPL source zone…. The strategy described in the present document utilizes converging lines of evidence that incorporate the scientific advancements in the field… ." The 1 percent of effective solubility threshold is one of six screening steps for groundwater described in the EPA paper that can be used to assess groundwater under a "converging lines of evidence approach to assessing DNAPL presence." See also Figure 3 of the EPA paper. The approach outlined in this work plan will use converging lines of evidence to identify NAPL presence or absence where NAPL is suspected (e.g., blebs, globules, or sheens) and, at a minimum, analytical chemistry will be used to identify areas that require remediation of chlorobenzene PTW, per the EPA ROD, regardless of whether NAPL is present or not.
S17	WP	Section 2.6 Groundwater, page 2-10	Provide a rationale for limiting the groundwater discussion to the area between the acid plant area and top of bank. See Specific Comment on Section 1.3. Also clarify why chlorobenzene is the only groundwater parameter discussed in this section.	As noted in work plan Comment S10, the work plan will be updated to discuss all Table 17 COCs from the Portland Harbor ROD. The discussion in this section was limited to chlorobenzene due to its potential impact on the design of the sediment cap.
S18	WP	Section 2.6.2 Groundwater Flux to the River, pages 2-11 to 2-12	Specify in this section which groundwater zone the UltraSeep system meters were deployed in during the 2004 and 2005 studies. It is not clear if the testing was done in the discharge area of the shallow, intermediate, or deep zone groundwater.	Clarification will be added to the work plan regarding the groundwater zones. Please note that the groundwater zones were not specified in the reports by the Lower Willamette Group, which conducted the groundwater discharge studies in 2004 and 2005.

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S19a	WP	Section 2.7 Existing Design Support Information, pages 2-12 through 2-20	EPA has the following comments on this section and the text should be revised accordingly: a. The river bank is regulated by the DEQ under an Order on Consent (DEQ No. LQVC- LQVC-NWR-08-04), and the 2017 in-water PHSS ROD. Much of the river bank contains electrolytic cell debris (e.g., concrete and anodes/cathodes). This debris was not characterized as part of the upland RI but is considered a possible contaminant source material. As determined by the DEQ/LSS river bank hot spot dispute resolution, the remedial alternatives for the river bank must evaluate the removal of the concrete and other cell debris along with the upper three feet of bank fill due to the likely presence of dioxin/furan (and potentially other contaminants) at concentrations above acceptable ecological risk levels and PHSS ROD CULs. This information should be included in Section 2.7 of the PDI WP.	Section 2.7 will be revised to summarize the outcome of the dispute resolution and acknowledge that remedial alternatives for the riverbank will include evaluation of the removal of concrete and other debris along with the upper 3 ft of bank fill based on the likely presence of contaminants at concentrations above PHSS ROD CULs. Debris evaluation will be included as part of the PDI.
S19b	WP	Section 2.7 Existing Design Support Information, pages 2-12 through 2-20	b. As part of the upland RI, LSS conducted an ecological risk assessment for terrestrial receptors along the river bank. This risk assessment concluded that there is unacceptable risk to burrowing mammals from river bank contaminants. This information should also be included in Section 2.7 of the PDI WP.	Note that an upland Level II screening ecological risk assessment was conducted at the Arkema Site; a Level III ecological risk assessment was not conducted. The Level II screening ecological risk assessment did not provide conclusions related to unacceptable risk to burrowing mammals (please see the Arkema Upland Level II Screening Ecological Risk Assessment dated January 19, 2009). Section 2.7 will be revised to include a more comprehensive summary of historical soil sample data along the riverbank collected as part of the Level II screening ecological risk assessment.
S20	WP	Section 2.7.2 Geology, page 2-14 and Figures 1-4 and 1-5	Clarify the extent of fill at the Arkema Site in the PDI WP text and figures. Figure 1-5 indicates extensive fill areas that are not shown in Figure 1-4 or described in the text.	Please note that Figure 1-5 presents the upland source control measures at the Arkema site. Documentation on filling activities in the Arkema Project Area is limited. Additional information will be added to the text regarding fill areas to the extent it is available.
S21	WP	Section 2.7.3 Geotechnical Investigations, page 2-15	Describe which groundwater unit the hydraulic conductivity tests apply to (i.e. shallow, intermediate, or deep zone groundwater).	The removal action area characterization report specified the groundwater zones where the hydraulic conductivity testing occurred. The potential groundwater zone(s) will be assessed and clarification will be added to the work plan.
S22	WP	Section 2.7.5 Dock Structures at the Arkema Site, page 2-8	Provide additional explanation regarding the method(s) planned to be used to evaluate the sediments under the docks. No sampling is proposed at this time. The sediment may be disturbed during dock removal and, therefore, may need to be characterized.	Sediment characterization will be performed in dredged and undredged areas immediately adjacent to docks, providing data on less than 150-ft centers near docks. Underdock sediment sampling is not proposed due to safety concerns and is not expected to differ significantly from adjacent sediment just outside dock footprint.
S23a	WP	Section 2.10.1 Surface Sediment and Riverbank Soil, page 2-27	EPA has the following comments on this section and the text should be revised accordingly: a. River bank soil, sediment, and porewater data from the GS Roofing site SCE work should be presented in the PDI WP and evaluated for data gaps and additional sampling needs to support RD. The GS Roofing river bank is part of the Arkema Project Area and is a ROD river bank of known contamination.	DEQ documents related to the GS Roofing SCE investigation have been requested and received. Information from these investigations will be summarized in the work plan and used to refine the approach to sampling, as requested. Further evaluation of the SCE will be performed as part of the Sufficiency Assessment to allow for incorporation of ongoing work at the GS Roofing site under DEQ.

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S23b	WP	Section 2.10.1 Surface Sediment and Riverbank Soil, page 2-27	b. This section states there are no data gaps for surface sediment; however, it is not clear what criteria were used to support this determination. Specify the data set used and state if the current data set is consistent with the EPA design guidelines for all focused COCs in surface sediment. Provide supporting figures as needed so the validity of these conclusions can be assessed.	Subsurface sediment data are critical to understanding what may become a surface sediment data gap because subsurface sediments may drive remedial actions regardless of surface contamination. Existing surface sediment data may be sufficient in some areas. Surface sediment data are not needed in areas where dredging is required to address Portland Harbor RAL and PTW threshold exceedances in subsurface sediment because these areas are anticipated to be dredged, which will remove the surface sediment. For example, the Arkema Project Area is known to contain contaminants at depth in some areas, such as the area between Docks 1 and 2. The focus of the Phase 1 sediment investigation is to delineate Portland Harbor RAL and PTW threshold exceedances in subsurface sediment. The areas that do not exceed Portland Harbor RALs and PTW thresholds in subsurface sediment will be assessed for data gaps in surface sediment. Any surface sediment data gaps identified will be addressed in Phase 2. The work plan text will be modified to clarify this methodology and the potential for surface sediment sampling in Phase 2.
S23c	WP	Section 2.10.1 Surface Sediment and Riverbank Soil, page 2-27	c. River bank soil was not fully evaluated as part of the upland investigations. It is unclear if the proposed sampling will be sufficient to fully address data needs for the river bank. Additional river bank sampling may be needed depending on the findings of the first phase of sampling and the proposed river bank design. Provide a discussion related to the evaluation of upland river bank data and indicate when additional river bank sampling (if needed) will be conducted.	The work plan will be revised to include a discussion of the upland riverbank soil data in the context of riverbank characterization needs, including when additional riverbank sampling (if needed) will be conducted.
S23d	WP	Section 2.10.1 Surface Sediment and Riverbank Soil, page 2-27	d. River bank soil data should also be compared with cleanup levels, in addition to RALs, to evaluate the potential for soil transport to the river to impede or delay achievement of RAOs in the Project Area. See General Comment 1.	Agreed, riverbank data will be compared to cleanup levels and RALs, consistent with the River Bank Guidance. This comparison will be a necessary part of the Sufficiency Assessment.
S23e	WP	Section 2.10.1 Surface Sediment and Riverbank Soil, page 2-27	e. No river bank data are available for 2,3,4,7,8-PeCDF, 1,2,3,7,8-PeCDD, 2,3,7,8-TCDD and total PCBs between Dock 1 and Dock 2 and are limited in other locations. Additional river bank areas beyond those identified should be sampled and analyzed for these analytes.	See response to work plan Comments G1 and G4—the scope and analysis list will be revised to address comments related to scope of riverbank sampling.
S24	WP	Section 2.10.2.7 NAPL and Chlorobenzene PTW, 3rd paragraph, page 2-34	Suggest refinement of the following statements on non-aqueous phase liquid (NAPL): "During previous investigations, sheens, blebs, and globules were observed in selected boreholes, which is consistent with a typical navigable river in an industrialized area. These latter sheens are not related to past industrial practices at the Arkema site and because they are not related to a NAPL source are not considered indicators of PTW in the Arkema Project Area." The area of NAPL observations in the Arkema Project Area is collocated with the area of chlorobenzene PTW exceedances and dismissing the NAPL as "consistent with a typical navigable river in an industrialized area" is not supported by the data presentation so this sentence should be removed or revised to providing supporting information. PTW delineation via field observations and laboratory testing is needed in the PDI to determine PTW areas for remediation.	The NAPL statements will be clarified in the text. LSS agrees that PTW delineation via field observations and laboratory testing is needed in the PDI to determine PTW areas for remediation. LSS presented a revised approach to NAPL and PTW delineation during a call with EPA on September 30, and the tentative resolution and agreements were documented in an email to EPA on October 2. The work plan will be revised to present the revised approach to addressing PTW delineation. LSS agrees that chlorobenzene PTW in sediment in the area of Docks 1 and 2 exceeds the EPA ROD chlorobenzene PTW criteria and further delineation of this area is not required, except to define the bottom of the chlorobenzene PTW.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S25a	WP	Section 2.10.3 Groundwater Discharge and Porewater, page 2-35	EPA has the following comments on this section and the text should be revised accordingly: a. The text states "Because of basic physical and engineering constraints, there will be some soil and groundwater beneath the Arkema Project Area river bank that cannot be remediated by either the groundwater SCMs [source control measures] or sediment remedial measures." This sentence is not clear and claims that an area cannot be remediated without providing a technical basis for that assertion. Please remove or revise by providing a technical basis for why the area cannot be remediated.	Clarification will be added to the work plan detailing potential physical and engineering constraints for remediating the riverbank area due to the presence of the groundwater barrier wall.
S25b	WP	Section 2.10.3 Groundwater Discharge and Porewater, page 2-35	b. Discuss groundwater data gaps for other areas in the Arkema Project Area, including contaminated groundwater at Lots 1 and 2 and at the GS Roofing site. Groundwater data gaps listed here are limited to the groundwater plume at the Dock 1 and 2 area.	The groundwater data gap analysis will be expanded in the work plan to include Lots 1 and 2 and the GS Roofing site.
S25c	WP	Section 2.10.3 Groundwater Discharge and Porewater, page 2-35	c. The text indicates that the post-remediation CSM for the Arkema Project Area is shown on Figure 1-7. Please clarify what is intended by "post-remediation". The reference to reference to Figure 1-7 may in error; Figure 1-9 may have been intended; modify if needed.	The figure reference is in error and should be Figure 1-9 as noted in this comment. The second sentence in Section 2.10.3 will be changed to the following: "The CSM for the Dock 1 and 2 Reach of the Arkema Project Area is shown on Figure 1-9."
S25d	WP	Section 2.10.3 Groundwater Discharge and Porewater, page 2-35	d. The section indicates that one key groundwater data gap is the COC concentrations in the upland shoreward of the barrier wall. The PDI WP should identify the upland groundwater COCs throughout this section.	The work plan will be updated to include the upland groundwater COCs throughout this section.
S26	WP	Section 2.10.3.2 Groundwater Discharge Data Gap 2—Hydraulic Gradients and Groundwater Flux to River, page 2-36	Additional data should be summarized in the PDI WP to demonstrate that contaminated groundwater is not circumventing the barrier wall. The specific comment on Section 1.2.3.2 discusses EPA's position on the current status of the GWET and barrier wall. Until hydraulic control can be established, uncertainty will remain whether contamination found river-ward of the barrier wall represents relict contamination or an ongoing contaminant source from an ineffective GWET system.	LSS plans to implement a Groundwater Extraction Enhancement in 2021 that is anticipated to achieve greater hydraulic control. Please see the response to work plan Comment S9 for additional details.
S27	WP	Section 2.10.3.2 Groundwater Discharge Data Gap 2—Hydraulic Gradients and Groundwater Flux to River, page 2-36	The groundwater flux study should be scheduled when ground levels and river stage are most favorable for measuring maximum groundwater flux.	LSS agrees with this comment and intends to conduct the groundwater flux study in the late fall when the river stage is the lowest and the hydraulic gradient is maximized. Clarification will be added to the work plan.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S28a	WP	Section 3.1.1.1 Problem Statement, page 3-1	EPA has the following comments on this section and the text should be revised accordingly: a. The section indicates that existing DDx and PeCDF/TCDD data for surface sediment are insufficient to define the remedial extent, yet previously in the document (for example Section 2.10.1) the text indicates that there are sufficient surface sediment data, pending results of the subsurface investigation. Clarify this apparent contradiction.	Please see response to work plan Comment S32b.
S28b	WP		b. The section indicates that data for focused COCs and additional contaminants are insufficient to prepare a remedial design. Clarify if all additional contaminants listed on Table 21 are being referenced.	Clarification will be added to the work plan.
S29	WP	Section 3.1.1 Sediment Chemistry, page 3-1	Include figures showing any existing data for the additional contaminants listed on ROD Table 21 in addition to the contaminants presented in Figures 2-1a-f.	Figures will be added to the work plan for additional Table 21 COCs for which data are available.
S30	WP	Section 3.1.1 Sediment Chemistry, page 3-1, and Figure 3-1	The text states that: "For safety reasons, sediment data will not be collected under the docks." Figure 3-1 shows Phase 2 vibracore samples to be collected under the docks. Resolve the inconsistency between the table and the text.	Revisions will be made to Figure 3-1, removing vibracore station under docks. See response to work plan Comment S22.
S31	WP	Section 3.1.1.2 Goals of the Study, Goal No. 4, page 3-2	Sufficiently low detection limits should be a priority for all analytes, not just PCBs, as indicated by the text. Additionally, the investigation should utilize laboratories capable of detection limits below the CULs to aid in design which targets attainment of CULs. Revise the text as appropriate.	Clarification will be added to Section 3.1.1.2 of the work plan that low detection limits will be a priority for all focused COCs so that CULs can also be attained. LSS notes that the CULs for dioxin and furan congeners will be difficult to meet with current analytical methods.
S32a	WP	Section 3.1.1.3 Study Design, page 3-2 through 3-4	EPA has the following comments on this section and the text should be revised accordingly: a. The text states that horizons will be a maximum of 2 feet (ft) in length below 1 ft below mudline (bml); smaller horizons may be sampled if the information is deemed necessary for more accurate vertical control during remedial dredging. As stated in EPA's Remedial Design Guidelines and Considerations (RDGC), subsurface cores must be sampled in 1-foot (ft) intervals in dredging areas within an SMA for the purpose of delineating the depth of contamination. Core sampling intervals in capping areas can be greater than 1-ft but must be representative of the material being capped. Based on site- specific parameters and in consultation with EPA, performing parties may propose a systematic approach for prioritizing chemical analyses to address concerns regarding sample volumes. Modify the text to be consistent with the RDGC.	The work plan text will be revised to state 1-ft intervals will be used in all potential dredging areas; longer intervals may be used in planned capping areas. The subsurface sediment sampling will start on the 1-2 ft or 2-3 ft interval, depending on the slope
S32b	WP	Section 3.1.1.3 Study Design, page 3-2 through 3-4	b. The Second paragraph on page 3-4 indicates that based on the results of subsurface sample data, surface sampling may be conducted to support remedial decision-making. The text should describe how the subsurface data will be interpreted to determine the need to conduct surface sampling.	In areas where subsurface sampling indicates dredging or dredging followed by capping is required, surface sediment data are not necessary for design. In areas with capping without dredging or an alternate remedy that leaves existing surface sediment in place, additional surface sediment data may be necessary for design and as such would be collected in Phase 2.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S33	WP	Section 3.2 Riverbank Soil, page 3-4	This section describes river bank soil sampling at select locations as shown on Figure 3-1. In general, the number and density of sample locations is insufficient (see General Comment 2c), and a second phase of river bank sampling may be necessary and should be acknowledged and planned for in the PDI WP. Further, the rationale for sample placement should be provided. For example, there is a cluster of sample locations between Outfall 004 and WR-6; the rationale for placement of the samples at this location should be provided. In addition, the rationale for the sample depth of four feet should be provided. Finally, no samples are proposed south and west of the Salt Dock, offshore of GS Roofing. This portion of the river bank should be characterized unless additional information is provided to support a determination that no characterization is necessary.	Please see the response to work plan General Comment 4—the scope of riverbank sampling will be revised. The work plan will also be revised to acknowledge that an additional phase of riverbank sampling may be necessary.
S34	WP	Section 3.2.1 Problem Statement, page 3-4	Revise the problem statement to state that RD will require surface and subsurface soil data that define the lateral and vertical extent of contamination in river banks and both ROD Table 21 contaminants and ROD Table 17 contaminants with river bank soil/sediment CULs (see Table 1 of the RBG) will need to be analyzed. While the extent of RALs and soil exceeding PTW thresholds is needed to determine active remediation areas, soil concentrations exceeding the ROD Table 17 river bank soil/sediment CULs may require remediation or a quantitative assessment of erodibility to determine the need for remediation to achieve the RAOs in the PHSS ROD. EPA's expectations for addressing ROD river banks is described in the RBG and the process is summarized in PDI WP Figure 1-3d.	The problem statement will be revised in the work plan as requested.
S35a	WP	Section 3.2.2 Goals of the Study, page 3-5	EPA has the following comments on this section and the text should be revised accordingly: a. Consistent with the RBG, update this section to include leaching and advective transport of contaminants from river bank soil as transport mechanisms that are to be evaluated.	The text in this section will be modified to include "leaching and advective transport of contaminants from riverbank soil" as transport mechanisms that will be evaluated in the PDI.
S35b	WP	Section 3.2.2 Goals of the Study, page 3-5	b. The first sentence in Section 3.3.2 states "The goal of this study is to identify and characterize NAPL, if observed, regardless of source, in subsurface sediment adjacent to the Arkema Project Area." The statement that NAPL will be identified and characterized "regardless of source" is contradicted by statements elsewhere that non- chlorobenzene NAPL in offshore sediments will be presumed to originate from other sources and will not be characterized. Clarify what the PDI WP will and will not do with respect to NAPL.	For clarification, the intention of the NAPL characterization adjacent to the Arkema site is to identify PTW related to any NAPL or dissolved-phase chlorobenzene regardless of the transport pathway to the nearshore sediments. If other NAPL related to Arkema Project Area groundwater plumes is identified, that will also be identified as PTW. The reason for distinguishing between non-chlorobenzene NAPL and chlorobenzene-related NAPL is that through 30+ years of groundwater investigation, no other NAPL sources or potential NAPL sources have been identified adjacent to the Arkema site. This fact combined with the observation of sheens in Willamette River sediment throughout Portland Harbor was the rationale for the statement. Because the presence of sheen is not necessarily equivalent to NAPL presence for the purposes of PTW definition, it is an important distinction to make with regards to the PDI work plan and NAPL delineation. Also, geochemical characterization of suspected NAPL areas (i.e., chlorobenzene, TPH, PAH analyses) are important to making this determination and supplementing the conceptual site model. The statement will be clarified in the PDI work plan. Also see LSS' summary of the September 30 meeting regarding the revised approach to NAPL delineation.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S36	WP	Section 3.2.3 Study Design, page 3-5 and Figure 3-2d	Note that all river bank samples should be analyzed for RBG Table 1 contaminants (see the specific comment on Section 3.2.1). The text states that: "Select soil samples will be analyzed for DDx, PCB congeners, dioxins and furans, and asbestos in accordance with the river bank soil sample analysis decision tree in Figure 3-2d." At a minimum, surface samples need to be analyzed for RBG Table 1 contaminants, and EPA recommends analysis of subsurface samples to prevent delays in design due to data gaps.	The work plan will be revised to reflect analysis of the full Table 1 for riverbank surface samples where historical data are not available for that list, and acknowledge the need for characterization at depth as part of the design.
S37	WP	Section 3.2.3 Study Design and Figures 3-2a-b, page 3-5	Additional river bank sampling locations are needed to provide full delineation of the CUL, RAL, and PTW extent at the river banks adjacent to the Arkema Project Area. As discussed at the July 16, 2020 meeting between LSS, EPA, and the Technical Coordinating Team members, river bank sampling locations are needed to address data gaps at potential contamination areas (e.g. fill areas) and to delineate SMAs shoreward of the river. The ROD requires remediation of the river banks contiguous with SMAs and the entire Arkema river bank is considered a ROD river bank.	See response to work plan General Comment 4—the scope of riverbank sampling will be revised.
S38	WP	Section 3.2.3 Study Design, page 3-5	Sampling the river bank "using a hand auger at 1 ft intervals to a depth of 4 ft bgs or refusal, whichever comes first" does not meet EPA's expectation for delineation of river bank contamination per the RBG. Given the nature of the river bank at Arkema it is unlikely that a hand auger will achieve 4 feet below ground surface and contingency sampling methods should be included in the PDI WP. Based on the proposed scope of river bank sampling, the depth of contamination in river bank soil will likely not be delineated during the PDI. That data gap would need to be filled with a supplemental PDI and should be acknowledged in the PDI WP.	The work plan will be revised to acknowledge that hand auger methods may not attain sufficient recovery to complete riverbank delineation, and additional phases and methods of sampling may be required, including methods such as sonic drilling. The sampling proposed under this work plan is expected to refine the site conceptual model of material on the riverbank, which will aid in the Sufficiency Assessment, where remaining data gaps for design may be identified and resolved.
S39a	WP	Section 3.3.1 Problem Statement, pages 3-5 through 3-6	EPA has the following comments on this section and the text should be revised accordingly: a. Clarify why the study seems to be limited to chlorobenzene NAPL. Any NAPL found via ultraviolet screening of shake tests needs to be addressed since the ROD does not differentiate between the types of NAPL, and it is unclear why the WP focuses on "chlorobenzene NAPL". Revise the PDI WP accordingly.	LSS presented a revised approach to NAPL and PTW delineation during a call with EPA on September 30, and the tentative resolution and agreements were documented in an email to EPA on October 2. The work plan text has been revised to clarify that any NAPL and PTW will be delineated in the Arkema Project Area. The previous focus on chlorobenzene NAPL was a CSM-based approach to address potential NAPL from the known historical manufacturing of DDT at the site. The other important element is to distinguish non-chlorobenzene sheens from actual NAPL. PTW for chlorobenzene is defined as either NAPL or dissolved-phase chlorobenzene exceeding 320 µg/kg, which will be confirmed with both field-screening for NAPL and chemical analysis. If other NAPL is identified, it will be important to identify the source and type. It is also important to understand that sheen is not equivalent to the presence of NAPL; thus the importance of the weight-of-evidence of the NAPL confirmation methods provided in the PDI work plan. See also response to work plan Comment S35b.
S39b	WP	Section 3.3.1 Problem Statement, pages 3-5 through 3-6	b. EPA does not agree with the positive identification of NAPL only based on laboratory testing. Revise the text to acknowledge that positive shake tests will be considered to represent the presence of NAPL in the core. This is consistent with NAPL identification procedures used at other sediment superfund sites and less conservative than the approach used at the Gasco Project Area. EPA also notes that the centrifugation method provides information on the mobility of free product and a lack of mobile NAPL does not indicate the absence of NAPL in the sediments. The ROD does not differentiate between mobile and residual NAPL and the presence of any NAPL is included in the ROD's definition of PTW-NAPL.	A revised approach for defining NAPL and PTW will be presented in the revised work plan. The revised approach focuses on the use of field screening and laboratory testing to define NAPL, if present. See also response to work pan Comment S39a.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S40	WP	Section 3.3.2 Goals of the Study, page 3-6	Clarify whether LSS plans to delineate the extent of NAPL impacts in Phase 2. The current study seems to be evaluating the presence/absence of NAPL in sediments and does not address delineating the extent of NAPL impacts. The rationale for limiting chemical analysis of NAPL to diesel range organics, gasoline range organics, and VOCs must be provided. Specifically address the exclusion of PAHs from this analysis.	Any NAPL impacts will be initially identified during Phase 1. If additional supplemental NAPL delineation is necessary based on Phase I delineation results, this will be supplemented during PDI Phase 2 sampling. LSS will include PAH analysis in the NAPL analytical scheme.
S41a	WP	Section 3.3.3.1 Unaided Visual Assessment, page 3-7	EPA has the following comments on this section and the text should be revised accordingly: a. The text indicates that photographs will be take of each 2-ft section of the core. Care should be taken to ensure that the photographed intervals can be paired with the 1-ft core sampling intervals described in the field sampling plan.	The PDI work plan text will be clarified.
S41b	WP	Section 3.3.3.1 Unaided Visual Assessment, page 3-7	b. The visual assessment of NAPL should include blebs, in addition to sheens and globules mentioned in the text.	Visual assessment will include sheens, globules, and blebs to the extent they can be distinguished visually and field screening protocol can be standardized such that independent observers will identify the same material the same way.
S42	WP	Section 3.3.3.2 Ultraviolet Fluorescence, page 3-8	The text states that: "The shake test with a hydrophobic dye, discussed below, will provide an additional line of evidence that will allow differentiation from non-target fluorescent materials and can positively identify the presence or absence of NAPL." EPA agrees with the positive identification of NAPL based on fluorescence observations in shake tests but notes that this statement is inconsistent with footnote 12 on page 3-7 and the rest of the approach outlined in the PDI WP. Revise the PDI WP to be consistent with this statement.	As a result of the revised NAPL and PTW identification approach, the shake test will remain an element of NAPL identification but the ultraviolet fluorescence has been removed. The UV fluorescence approach was primarily focused on the identification of chlorobenzene. Because the PTW identification approach has been modified to include chemical analysis to identify the presence or absence of chlorobenzene on any sample outside of the dock area that exhibits the presence of potential NAPL via a shake test, the UV fluorescence screening is no longer required. For the purpose of remedial design, LSS is considering all sediment that requires remediation in the Dock Reach to be PTW based on chlorobenzene and/or chlorobenzene NAPL. This approach will be clarified and made consistent throughout the work plan.
S43	WP	Section 3.3.3.4 Laboratory Assessment - Sediment Physical Parameters, page 3-8	The specified grain size test should be ASTM International (ASTM) D422-modifed, not D422 as stated in the text.	The work plan will be revised as requested.
S44a	WP	Section 3.4 Sediment Stability, page 3-9	EPA has the following comments on this section and the text should be revised accordingly: a. The section indicates that sediment cores will be advanced to assess historical deposition rates downstream of Dock 2 during Phase 2, if necessary, based on the results of the Phase 1 investigation. The text should describe circumstances under which Phase 1 results would trigger this Phase 2 investigation.	Please see response to work plan Comment S45.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S44b	WP	Section 3.4 Sediment Stability, page 3-9	b. The text indicates that the sediment stability assessment will be used to assess historical deposition rates downstream of Dock 2. The text should explain the importance of historical deposition rates for the design, in particular because the text previously states that the docks will be removed as part of remedial construction, altering river dynamics and future deposition rates.	Please see response to work plan Comment S45.
S45	WP	Section 3.4.2 Goals of the Study, page 3-10	The text suggests that monitored natural recovery (MNR) or enhanced natural recovery (ENR) may be considered based on results of geochronology cores. Note that MNR is not an approved remedial technology for active remediation areas (i.e. SMAs) according to the ROD. While assessing the rates of deposition and potential recovery is useful for the overall CSM, it cannot be used to recommend MNR within SMAs. Revise the text accordingly. Additionally, Table 3-5 discusses the methods to be used to estimate sedimentation rates based on the depth to the maximum DDT concentration in subsurface sediments. The maximum concentration is expected to represent 1947, and an annual average sedimentation rate is calculated based on 73 years since that date. However, justification is needed for the assumption that the maximum concentration represents 1947. DDT production continued into the 1950s, and disposal of DDT-containing wastes continued as well, so the maximum concentration could represent a more recent date (which would then indicate a different sedimentation rate). Also, there was a major flood in the area in 1948 that would have greatly disturbed sediment stratigraphy and also more recent flooding in 1996. Therefore, the validity of this line of evidence is limited. Revise the text in this section accordingly and Table 3-5 should cross-reference this information.	The work plan text will be revised to remove reference to MNR/ENR within the SMA and use of geochronology will be removed.
S46	WP	Section 3.5.2.1 Problem Statement, page 3-12	Clarify in the text whether additional bathymetry data is needed for improved coverage in nearshore areas for RD and when this data will be collected. Text in Section 3.4.1 indicates there is a potential data gap in nearshore areas for the existing bathymetry.	Clarification will be added to the work plan text.
S47	WP	Section 3.5.2.1 Problem Statement, page 3-13	Clarify in the text the if the pre-dredge bathymetric survey discussed in the text will be performed by a party performing remedial design or remedial action (RA). The text states, “a pre-dredge bathymetric survey will be required immediately prior to construction”. It is not clear why the survey is discussed in the PDI WP if it is not part of a PDI.	Reference to pre-dredge survey will be removed from the work plan for clarity.
S48	WP	Section 3.5.2.3 Study Design, page 3-13	Clarify in the text whether the combined surveys described in this section refer to additional investigations to be completed in the future or if it proposes combining existing surveys for PDI.	Existing survey data will be merged and used as practicable.
S49	WP	Section 3.6.1.3 Study Design, page 3-15	The proposed groundwater analytical suite must be more inclusive of all relevant Arkema contaminants and contaminants detected in top of bank monitoring wells. Revise the proposed analytical suite to include all Table 17 COCs with groundwater CULs (including chlorobenzene and chromium), Table 21 focused COCs, chloroform, and chloride. As described, the current analytical suite is insufficient based on the CSM.	The work plan will be updated to include the groundwater suite noted in this comment.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S50a	WP	Section 3.6.2.3, Study Design, page 3-16	EPA has the following comments on this section and the text should be revised accordingly: a. The text states "Water levels in four piezometers at the toe of the slope below each of these well clusters, piezometers P-1, P-2, P-3, and P-4, will also be monitored…" Figure 3-4 does not show a piezometer below well cluster 4 (MWA-46/MWA-49i/MWA-56d). Update the text and the figure to be consistent with the goal of the study.	The work plan will be updated to include a piezometer below the MWA-46/MWA-49i/MWA-56d well cluster.
S50b	WP	Section 3.6.2.3, Study Design, page 3-16	b. The reference to "tidal influence filtering" is presumably a reference to the tidal averaging method of Serfes (1991), which should be cited.	The tidal influence filtering method of Serfes (1991) will be utilized. The work plan will be updated to include the reference.
S51	WP	Section 3.6.3.3 Study Design, page 3-17 through 3-18	Analysis of seepage meter and Trident Probe samples needs to be expanded to include ROD Table 17 COCs with groundwater CULs, ROD Table 21 focused COCs, and chlorobenzene. Without concentrations for ROD Table 17 COCs it cannot be verified that the cap design is sufficient to achieve CULs.	The seepage meter and Trident Probe samples will be analyzed for groundwater COCs listed in Tables 17 and 21 of the Portland Harbor ROD. In addition, chloroform and chloride will be analyzed in these samples.
S52	WP	Section 3.7.3.2 Site Visit and Observation, page 3-20	Expand the discussion around "visually assess[ing] hydrodynamic conditions". Explicitly state which parameters and characteristics of those parameters will be documented visually. The text should also indicate if there are specific water level conditions that will be targeted, and if so, why.	The work plan will be revised as requested to include this additional detail.
S53	WP	Section 3.7.3.3 Hydrodynamic Evaluation, page 3-20	Clarify in the text whether the hydrodynamic evaluation is a preliminary evaluation of existing data to identify potential data gaps and detailed evaluations will be conducted during RD. A quantitative assessment of hydrodynamic impacts to the remedy, specifically armor layer requirements for caps, is required in RD. Feasibility study level evaluations are not sufficient for the purposes of design.	The work plan will be revised to clarify that this step is a preliminary evaluation to identify information that will be necessary for design once the scope of the remedy is further defined.
S54	WP	Section 3.8.2 Goals of the Study, page 3-21	The assessment list should include geotechnical concerns for addressing cap design, including consolidation, shear strength, etc. These are part of the study design and need to be listed in Section 3.8.2.	Additional details on geotechnical analyses and data collection will be added to the PDI work plan. Geotechnical data to support cap design will be collected in Phase 2 based on extents of sediments exceeding RALs or PTW identified in Phase 1. This will allow focused collection of geotechnical data as needed for dredge or cap design. Geotechnical analysis of underlying materials to remain and capping material, including consolidation testing, bearing capacity, and shear strength, will be performed consistent with the guidance documents as needed for design. Note, the existing slurry wall will also need to be accounted for within the engineering design and geotechnical stability analysis.
S55a	WP	Section 3.8.3 Study Design, page 3-21	EPA has the following comments on this section and the text should be revised accordingly: a. Locations selected for the geotechnical evaluation should be representative of both dredging and capping areas, not just dredging areas as stated in the text. Revise the text and sampling location figures as appropriate.	Geotechnical data to support cap design will be collected in Phase 2 based on extents of sediments exceeding RALs or PTW identified in Phase 1. This will allow focused collection of geotechnical data as needed for dredge or cap design. Geotechnical analysis of underlying materials to remain and capping material, including consolidation testing, bearing capacity, and shear strength, will be performed consistent with the guidance documents as needed for design.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S55b	WP	Section 3.8.3 Study Design, page 3-21	b. The analysis of physical properties described is insufficient to address slope stability concerns at river banks. Include shear strength testing in addition to moisture content, grain size analysis, Atterberg limits, and organic content to evaluate slope stability under both static and seismic conditions.	Geotechnical data to support cap design will be collected in Phase 2 based on extents of sediments exceeding RALs or PTW identified in Phase 1. This will allow focused collection of geotechnical data as needed for dredge or cap design. Geotechnical analysis of underlying materials to remain and capping material, including consolidation testing, bearing capacity, and shear strength, will be performed consistent with the guidance documents as needed for design. Note, the existing slurry wall will also need to be accounted for within the engineering design and geotechnical stability analysis.
S56	WP	Section 4.0 Field Methodology, page 4-1	Revise text to indicate that the Project Manager will be responsible for coordinating EPA approval of deviations via field change request forms. Any deviations from the PDI WP need to be provided immediately for EPA for approval.	The work plan will be updated to reflect this change. LSS intends to be in close contact with the EPA team during all aspects of the field program.
S57	WP	Section 4.0 Field Methodology, page 4-1 through 4-4	In order to minimize the number of field change requests, provide a contingency plan for cases where field conditions prevent execution of the sampling program as planned for the following: surface sediment sampling, sonic drilling, mud-rotary drilling, vibracore sampling, hand auger boreholes, and porewater sampling. Include the number of sampling attempts before the location will be abandoned and parameters for moving to a new location (e.g. radius from original location, conditions which necessitate total abandonment). Clarify whether less than 3 surface sediment subsamples will be accepted in locations with poor recovery.	This clarification will be added to the work plan. LSS agrees that this clarification will streamline the field program and minimize the number of field change requests.
S58	WP	Section 4.1 Surface Sediment, page 4-1	Clarify what conditions trigger potential surface sampling in Phase 2 of the PDI. Discuss whether Phase 2 sampling location and/or analytes of interest are dependent on Phase 1, and if so, describe what implications the findings of Phase 1 could have. Also provide an analyte list for the “chemistry analyses” proposed for the potential surface sediment sampling.	See response to work plan Comment S23b. Text will be revised to include all Table 21 contaminants (focused COCs and additional contaminants, including chlorobenzene).
S59	WP	Section 4.2 Subsurface Sediment, page 4-1	The subsurface sediment samples must be analyzed for all ROD Table 21 contaminants. It is not clear which analytes are included as “focused COCs”. Revise the text to state that all ROD Table 21 COCs, including focused COCs and additional contaminants, will be analyzed for SMA delineation.	The work plan will be updated to include the analysis of all ROD Table 21 COCs for SMA delineation.
S60	WP	Section 4.2.1 Sonic Drilling, page 4-1 through 4-2	Provide the required sample recovery for the planned 2.5 ft drives and discuss the contingency plan for cases where field conditions prevent adequate retrieval.	The target recovery for the 2.5 ft drives will be 80%. If this recovery is not achieved, shorter drives (e.g., 1 or 2 ft) will be advanced. The sediment recovered from the shorter drives will be representative of the specific interval, even if the recovery is less than 80%.
S61	WP	Section 4.2.2 Mud-Rotary Drilling, page 4-2	Provide the target depth for the mud rotary borings and discuss the contingency plan for cases where field conditions prevent adequate sample retrieval.	Target depth is 25 ft below mudline. Additional borings will be performed as needed to ensure adequate sample retention and data collection for design.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S62	WP	Section 4.3 Riverbank Soil, page 4-3	The limited depth of the river bank soil sampling (4 ft or refusal for hand auger and 6 ft for backhoe) is inadequate to evaluate the potential transport mechanisms listed in the problem statement of Section 3.2.2. Sampling approaches need to be modified so that exploration depths extend to the maximum contamination depth or to the maximum slope failure depth expected. It is likely that test pit sampling does not establish the depth of contamination, and additional sampling will be required to vertically delineate contamination in river bank soil.	The work plan will be revised to acknowledge that hand auger methods may not attain sufficient recovery to complete riverbank delineation, and additional phases and methods of sampling may be required, including methods such as sonic drilling. The sampling proposed under this work plan includes utilization of other evaluative tools for contaminant delineation like groundwater flux measurement. The combined data set is expected to refine the site conceptual model of material on the riverbank, which will aid in the Sufficiency Assessment, where remaining data gaps for design may be identified and resolved.
S63	WP	Section 4.4.3 Seepage Meters and Section 4.5 Sediment Porewater, page 4-4	Seepage meter sampling locations are limited to the area downstream of the barrier wall. It would be beneficial to measure seepage flux in capping areas identified by the ROD to collect data for cap designs; however, it is acceptable to defer this to a later stage. Similarly, the proposed scope of porewater sampling would be insufficient for designing caps and additional porewater data will be needed at a later stage.	Comment noted. The seepage meter program will be expanded to include the GS Roofing and Lots 1 and 2 areas (see response to work plan Comment S9 for additional details).
S64	WP	Section 4.6.3 Debris, page 4-6	Consider use of an appropriate hydrographic technology (e.g., side scan sonar) to identify debris not visible from the surface during low water conditions.	The work plan will be revised to acknowledge that other methods of evaluating debris are available and may be utilized, depending on results of initial phase of work proposed.
S65	WP	Section 6.0 Schedule, page 6-1	The text in this section states that the draft Pre-Design Investigation Evaluation Report will be provided to EPA within 90 days of receipt of final validated data. Other performing parties at Portland Harbor have 45 days after receipt of validated data to provide the draft PDI evaluation report so the PDI evaluation report should be provided to EPA within 60 days of receipt of final validated data.	LSS will revise this section to indicate that LSS anticipates submitting the draft Pre-Design Investigation Evaluation Report within 60 days of receipt of final validated data. However, due to the size and scope of this investigation and the anticipated collaboration with the EPA team, an additional 30 days may be required.
S66	WP	Figure 1-8a Data Excluded from Consideration Due to Detection Limits above RALs or PTW Thresholds	These data should be included in other figures that show previous sampling in the area with a note that the method detection limits (MDLs) exceed RALs. Because MDLs for these samples exceed RALs, there is no way to know whether or not the locations have contamination which exceeds RALs. These locations present a data gap in contaminant delineation.	Please note that the legend on Figure 1-8a has an error that will be corrected in the revised work plan. The figure shows surface and subsurface sediment sample locations with detection limits above RALs or PTW thresholds. LSS agrees that if the MDLs exceed RALs, the data cannot be used for RAL exceedance screening. Therefore these data are not included on the figures that show existing data. Please note that many of these locations are collocated with other samples with MDLs below the RALs, so not all locations constitute data gaps.
S67	WP	Figures 3.1 through 3.2 Proposed Remedial Design Investigation Subsurface Sediment and Riverbank Soil Chemistry Sampling Stations	On all figures showing proposed core locations, note the planned maximum depth of the cores. In the text, explain the rationale for different core depths; specifically, clarify why some cores are limited to 15- to 16-ft maximum core depth. Sediment contamination exceeding RALs or PTW thresholds must be vertically delineated, and if DOC is not determined, additional sampling will be required.	Planned core depths will be shown on the figures. Phase 1 core depths are limited in locations where vibracore will be used. In the event the vertical extent is not achieved in Phase 1, based on two clean 1-ft intervals, additional coring using alternate methodology (i.e., drill rig on barge) will be used as needed during Phase 2 to determine vertical extent.
S68	WP	Figure 3-1	Add a figure that shows areas with known exceedances of RALs and CULs in river bank soils along with the proposed river bank sampling locations. Also include soil borings located in the upland near top of the bank that exceed RALs and CULs.	The work plan will be revised to include the requested information on a new figure.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S69	WP	Figure 3-1	The proposed subsurface sample density at both ends of the project area (downstream and upstream) is not consistent with EPA's 150-ft sampling grid guidance. Revise the PDI WP to address this data gap. Additionally, if PDI sampling indicates that there is contamination in the navigation channel then the project area boundary will need to be adjusted using additional step out samples. Revise the PDI WP to acknowledge this.	The work plan text will be revised to include sampling to be performed at north and south ends, and within the navigation channel at a maximum 150-ft spacing interval to delineate the horizontal and vertical extent of contamination. This will include the step out procedure. Sampling maps will be revised in the work plan.
S70	WP	Figure 3-2c	The bottom two core intervals must be sampled for all ROD Table 21 contaminants, including chlorobenzene to confirm depth of contamination. Revise this flowchart accordingly.	Text will be revised to include all Table 21 contaminants (focused COCs and additional contaminants including chlorobenzene).
S71	WP	Figures 3-2c and 3-2d	It is unclear how the term "target COC" is being used in these figures. Clarify in these figures which COCs would be analyzed before the step of "analyze sample for remainder of target COCs.	The "target COC" is referring to the COC(s) that may exceed the RALs or PTW thresholds based on the historical data set. The purpose of initially analyzing for target COCs is to streamline the process for reaching the goal of analyzing two consecutive sediment samples with results below the RALs or PTW thresholds. Clarification will be added to these flow chart figures in the work plan.
E1	WP	Figure 2-4a	The bathymetry color-coded elevation range legend should be improved by expanding the range and adding numbers corresponding to colors (or assigning numbers to colors as in Figure 2-4b).	The elevation ranges will be added to this figure in the work plan.
E2	WP	Figure 3-1	The brown dashed line between the upland and WR-6 needs to be defined in the legend. If it has no purpose, it should be removed.	The brown dashed line represents the approximate location of the conveyance system for outfall WR-6. This will be added to the legend.
E3	WP	Section 1.3.2.1 Upstream Reach, page 1-14	The last sentence of paragraph 3 incorrectly references Figures 1-8a-c. Revise this sentence to reference Figures 1-10a-c.	This will be changed to the correct reference of Figures 1-10a-c in the work plan.
E4	WP	Section 1.3.2.2 Dock 1 and 2 Reach 2, page 1-14	The reference to Figure 1-7 may be a typo; Figure 1-9 appears to be intended. This error should be corrected throughout the document.	The reference was intended to be Figure 1-9. This change will be made throughout the work plan as appropriate.
E5	WP	Section 1.3.2.2 Dock 1 and 2 Reach, page 1-15	The last sentence of paragraph 4 incorrectly references Figures 1-8a-c. Revise this sentence to reference Figures 1-10a-c.	This will be changed to the correct reference of Figures 1-10a-c in the work plan.
E6	WP	Section 2.10.1 Surface Sediment and Riverbank Soil, page 2-27	Correct the reference in the second paragraph related to Section 2.11.2 which is likely intended to refer to Section 2.10.2.	This change will be made to the work plan.
E7	WP	Section 2.10.2.7 NAPL and Chlorobenzene PTW, page 2-34	EPA Recommends that the adjectives "upland" and "offshore" be used to clarify all references in the discussions of NAPL investigations to avoid ambiguous terminology such as boreholes (which could be drilled either upland or offshore).	The reference to "upland" and "offshore" will be used to the extent possible to clarify the references in the NAPL investigation to avoid ambiguity in this section of the PDI work plan.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
E8	WP	Section 2.10.2.7 NAPL and Chlorobenzene PTW, page 2-34 1st Paragraph	The text states "The definition of these latter areas is presently a data gap for remedial design." It is not entirely clear what "latter areas" refers to. Terminology such as "upland areas where NAPL is present" is suggested.	This PDI work plan text will be clarified to state upland or offshore areas are being specified in this section of the PDI work plan text.
E9	WP	Section 2.10.2.7 NAPL and Chlorobenzene PTW, page 2-34 2nd Paragraph	The text states "These latter sheens are not related to past industrial practices at the Arkema site and because they are not related to a NAPL source are not considered indicators of PTW in the Arkema Project Area." It is unclear what "latter sheens" refers to and should be revised to "sheens, blebs, and globules in offshore sediment samples".	This statement will be clarified in the revised PDI work plan text.
E10	WP	Section 3	The phased approach is referred to throughout the section and then defined in Section 3.9. Consider moving Section 3.9 Phased Pre-Design Investigation Approach to the beginning of Section 3.	The requested change will be made to the work plan.
E11	WP	Section 3.6.3.3 Study Design, page 3-17	The references to "seepage meters" should be described as UltraSeep meters (similar to section 4.4.3) to distinguish them from the more common Lee (1978) seepage meter.	This clarification will be made to the work plan.
G1	FSP	General	**Contaminants of Concern:** As noted in PDI WP General Comment 1, all ROD Table 17 CULs and Table 21 RALs and PTW thresholds must be considered for RD. The proposed analytical program is not inclusive of all relevant contaminants and their omission is not justified through a developed CSM. EPA recommends a discussion of any contaminants which are planned to be omitted or revisions to the FSP to include analysis of at least all ROD Table 21 contaminants. Revise all sections of the text accordingly, for example, Section 2.1 states that surface and subsurface sediment data are insufficient to define the horizontal and vertical remedial extent for the focused COCs and this needs to be corrected to be inclusive of all ROD Table 21 COCs.	Text will be revised to include all Table 21 contaminants (focused COCs and additional contaminants including chlorobenzene) for all samples used for mapping of horizontal and vertical extent. The two consecutive 1-ft intervals that are below the Table 21 criteria will be run for ROD Table 17 CUL contaminants.
S1	FSP	Section 2.4 Bank and Shoreline Soils, page 2-2	Revise this section to address EPA's expectation that full chemical characterization of the river banks be conducted to identify the extent of contamination relative to ROD Table 21 RALs and PTW thresholds and river bank soil/sediment CULs listed in ROD Table 17. Chemical characterization of river banks must extend from the top of the river bank to the mean low water, regardless of erodibility, to determine if the protectiveness goals of the PHSS selected remedy RAOs are met. See PDI WP General Comment 2b and specific comment on Section 3.2.1.	See response to work plan General Comments 1 and 4—the scope and analysis list will be revised to address comments related to scope of riverbank sampling.
S2	FSP	Section 2.5 Groundwater Discharge and COC Flux, page 2-2	Revise the second sentence to clarify what is meant by elevated concentration e.g. exceeding ROD Table 17 CULs or other thresholds.	The FSP will be updated to include the range of COC concentrations on the downgradient side of the groundwater barrier wall. This section will also be expanded to include data gaps identified near GS Roofing and the Lot 1 and 2 area.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S3	FSP	Section 3.0 Sampling Location and Frequency, Surface sediment bullet point, page 3-1	Revise this bullet point to acknowledge that analysis of chlorobenzene will be included based on Phase 1 results. Due to the historical chlorobenzene impacts at Arkema, EPA strongly recommends including chlorobenzene in the suite of analytes for sediment sampling during Phase 1.	Text will be revised to include all Table 21 contaminants (focused COCs and additional contaminants including chlorobenzene) used to determine horizontal and vertical extent.
S4	FSP	Section 3.0 Sampling Location and Frequency, Subsurface sediment (chemistry) bullet point, page 3-1	Provide rationale for limiting PAH and chlorobenzene analysis to "selected samples". The site CSM indicates the presence of PAHs and chlorobenzene, and complete delineation is required to confirm the SMAs. As stated in FSP General Comment 1, all ROD Table 21 contaminants (focused COCs and additional contaminants) must be analyzed in sediment samples unless a technical rationale can be provided for the exclusion of a Table 21 contaminant. Also specify the QAPP table or PDI WP section that identifies the COCs to be analyzed for each sample or group of samples.	Text will be revised to include all Table 21 contaminants (focused COCs and additional contaminants including chlorobenzene) used to determine horizontal and vertical extent.
S5	FSP	Section 3.0 Sampling Location and Frequency, Subsurface sediment (NAPL evaluation) bullet point, page 3-1	Revise the text to clarify the why PAHs are not included in the list of analytes for NAPL analysis.	LSS has included PAHs in the list of analytes for NAPL. This revision will be reflected in the revised PDI work plan.
S6	FSP	Section 3.0 Sampling Location and Frequency, Bank and shoreline soils bullet point, page 3-1 and Figures A-1 and A-2a-b	Provide the rationale for the proposed river bank sampling locations. As proposed, the current sampling plan will leave much of the river bank uncharacterized. EPA recommends that the entire river bank be chemically characterized for contaminants listed in Table 1 of the RBG so that potential sources are fully characterized, and appropriate cleanup can be implemented if necessary, to prevent recontamination of the in-water remedy.	See response to work plan General Comments 1 and 4—the scope and analysis list will be revised to address comments related to scope of riverbank sampling.
S7	FSP	Section 3.0 Sampling Location and Frequency, Groundwater discharge and COC flux bullet point, page 3-1 and Figure A-3	EPA recommends adding groundwater gradient contours to Figure A-3 to support the proposed locations for the groundwater discharge study. Also provide justification for omitting other contaminants from the groundwater investigation. Groundwater monitoring wells at Arkema have historically encountered elevated NAPL, chlorobenzene, and pesticide concentrations. Section 2.2 of the FSP states, "Chlorobenzene concentrations in sediment and in groundwater beneath the river bank area need to be evaluated to inform PTW determination and for other parts of remedial design." At a minimum, the groundwater investigation should include analysis of all ROD Table 21 focused COCs, any historically detected pesticides not in Table 21, ROD Table 17 contaminants with groundwater CULs, NAPL, and chlorobenzene.	Please see the response to work plan Comment S10 regarding the expanded analyte list for groundwater. Groundwater contours will be added to FSP Figure A-3 and work plan Figure 3-4.
S8	FSP	Section 3.0 Sampling Location and Frequency, Porewater bullet point, page 3-1 through 3-2	Provide the rationale for limiting the analyte list to VOCs. Chloroform and chromium groundwater plumes are also known to be present in the project area so porewater sampling should at least include analysis of all ROD Table 17 COCs with groundwater CULs, ROD Table 21 focused COCs, and chlorobenzene.	Please see the response to work plan Comment S9.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S9	FSP	Section 3.0 Sampling Location and Frequency, Geotechnical bullet point, page 3-2	Revise the list of geotechnical analyses to include unit weight and consolidation testing. Consolidation testing was mentioned in the PDI WP text but needs to be incorporated into the FSP as appropriate.	The work plan will be revised as requested.
S10	FSP	Section 4.0 Sampling Equipment and Procedures, pages 4-1 through 4-22	Revise this section to describe field procedures for observing and documenting NAPL in all applicable sampling programs.	The field procedures for NAPL identification in Section 4.4.1.3 will be updated to describe the procedure for observing and documenting NAPL per the revised and updated NAPL delineation approach.
S11	FSP	Section 4.1 Subsurface Utility Clearance, page 4-1	If alternate locations are identified as a result of utility surveys, this information must be provided to EPA immediately for approval via field change requests. Revise the text to acknowledge this.	The FSP text will be updated to acknowledge that this information must be provided to EPA immediately for approval through field change requests.
S12	FSP	Section 4.2 Horizontal and Vertical Control, page 4-1	Note that EPA prefers the use of a fathometer over a weighted line so a fathometer must be used to measure mudline depth in addition to a weighted line.	Text will be revised to also include a fathometer reading. However, the lead line, constructed and used consistent with USACE Hydrographic Survey Manual procedures, may provide greater accuracy.
S13a	FSP	Section 4.3 Surface Sediment, pages 4-2 through 4-3	EPA has the following comments on this section and the text should be revised accordingly: a. Revise the text to note that the sampling location must be approached at a low boat speed to minimize disturbance of sediment. Additionally, EPA recommends using a peristaltic pump with flexible tubing to siphon overlying water from the power-grab sampler due to its greater efficiency and higher degree of control.	LSS agrees that a peristaltic pump will provide a greater degree of control for removing standing water above the sediment. These changes will be made to the FSP.
S13b	FSP	Section 4.3 Surface Sediment, pages 4-2 through 4-3	b. For the physical characteristics being recorded for surface sediment samples, sheens, blebs/globules, and other potential identifiers of NAPL should also be recorded. Observations of all organisms should be recorded regardless of size. Similar to the last paragraph in Section 4.4.1.1, add text at the end of this section discussing how excess sediments will be handled for disposal.	These revisions will be included in the revised work plan.
S14	FSP	Section 4.4.1.1 General Procedures, pages 4-4 through 4-5	The text states that: “The core tube will be driven to the target depth of 15 ft bml or refusal, whichever comes first, and retrieved.” If the retrieved core is not sufficient to define the depth of contamination additional subsurface sampling will be needed during supplemental PDI sampling. Delineation of the depth of contamination will be required for areas with NAPL or areas where dredging is the assigned technology. If the sampling location is not within a dredging area, sediments with concentrations exceeding RALs or PTW thresholds at depth may be left in place if it can be demonstrated that the subsurface sediments will remain stable. Refer to RDGC Appendix B for additional details on delineating depth of contamination. Additionally, revise the last sentence of the first paragraph to include observations of blebs/globules and other potential indicators of NAPL. Also add text stating that cores will be kept on ice if core sections are kept on the boat for extended periods or sampling occurs in hot weather conditions.	LSS acknowledges that if the retrieved core is not sufficient to define the depth of contamination, additional subsurface sampling will be needed during supplemental PDI sampling and that delineation of the depth of contamination will be required for areas with NAPL, if any, or areas where dredging is the assigned technology. LSS also acknowledges that for sampling locations not within a dredging area, sediments with concentrations exceeding RALs or PTW thresholds at depth may be left in place if it can be demonstrated that the subsurface sediments will remain stable. The last sentence will be modified to include the NAPL indicators, and text will be added regarding storing cores on ice if the sections are kept on the boat for extended periods or if sampling occurs in hot weather conditions.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S15a	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	EPA has the following comments on this section and the text should be revised accordingly: a. Remove the first sentence from this section and "However" from the second sentence. The text states, "Based on previous investigations conducted in the Arkema Project Area, NAPL is not expected in sediments." The sentence is both misleading based on upland information and out of context in the FSP.	This sentence will be removed from the revised PDI FSP text. Also see LSS' summary of the September 30 meeting regarding the revised approach to NAPL delineation.
S15b	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	b. As stated in the PDI WP specific comment on Section 3.3.1, a positive shake test will be considered PTW NAPL and centrifuge testing will be used to inform physical parameters and chemistry of NAPL. Make the Section 4.4.1.3 text consistent with the Section 3.3.1 text.	Text in this section of the work plan will be made consistent with Section 3.3.1 of the work plan. Also, see response to work plan Comment S39a.
S15c	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	c. Revise the text to state that the physical parameter testing for extracted NAPL will include wettability and NAPL interfacial tension with water. If NAPL volume collected is not enough to complete all tests the testing may be prioritized as appropriate.	The text in the work plan will be revised as indicated.
S15d	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	d. The last sentence of the first paragraph indicates that NAPL properties will be used in RD for capping to determine potential breakthrough based on COCs. Note that for capping in NAPL areas, not just dissolved contaminant migration but advective transport of mobile NAPL will also need to be evaluated during RD.	Comment noted. The presence or absence of upgradient NAPL sources and advective transport of mobile NAPL, if present, will be evaluated during RD.
S15e	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	e. Globules are defined as spheres "typically ranging in size from 0.01 to 0.05 in. in diameter". Revise the text to include a reference for this size range.	The text in the work plan will be revised to indicate the size range for a globule.
S15f	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	f. Provide a reference to support the statement that residual NAPL is immobile or remove this text.	A reference for the definition of residual NAPL will be provided in the work plan.
S15g	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	g. Expand the Unaided Visual Assessment section to clarify how discontinuous sheen, continuous sheen, globules, mobile NAPL, and residual NAPL will be identified and differentiated from each other in the field.	Several of these terms are determined in combination with physical and chemical testing. This will be clarified in the revised PDI work plan.
S15h	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	h. The Shake Test Protocols subsection states that: "The contents of the tube will be mixed by shaking by hand for 25 to 30 seconds and examined for the presence of NAPL." The contents should be allowed to equilibrate after shaking. Clarify in the text if and how long the contents will be allowed to equilibrate before examining for presence of NAPL.	The length of time the tube will be allowed to settle and equilibrate will be clarified in the PDI work plan.
S15i	FSP	Section 4.4.1.3 NAPL Stations, pages 4-6 through 4-10	i. In the NAPL Physical Parameters and Chemicals of Concern subsection, add wettability and interfacial tension with water to the list of parameters to be analyzed.	Wettability and interfacial tension will be added to the list of physical parameters to be analyzed.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
S16	FSP	Section 4.4.1.4 Sediment Stability Stations, page 4-11	Provide the rationale for only including DDx in the sediment stability cores. Analysis of all ROD Table 21 contaminants is likely not needed for the geochronology cores but the rationale for only analyzing DDx should be provided for completeness.	Geochronology cores will be removed from the PDI work plan.
S17	FSP	Section 4.4.1.5 Elutriate Testing, pages 4-11 through 4-12	Elutriate testing needs to include all ROD Table 17 COCs with surface water CULs, at least the ones with applicable acute water quality criteria (based on president set at the Gasco Sediments Site).	Text will be revised to include all ROD Table 17 COCs with surface water CULs and applicable acute water quality criteria (based on precedent set at the Gasco Sediments Site) for elutriate testing.
S18	FSP	Section 4.4.2.1 General Drilling Procedures, page 4-14	Correct the citation for the Standard Penetration Test to D1586-18 from D1586-11. Clarify if consideration was given to performing pocket penetrometer (or torvane) measurements on the split spoon and Shelby tube samples in the field given the retrieved samples are expected to be fine grained plastic sediments. Also discuss what provisions are in place to measure shear strengths of very soft fine-grained plastic sediment in case adequate recovery cannot be obtained with Shelby tube samples and if consideration was given to performing field vane shear strength tests.	The work plan will be revised as requested.
S19	FSP	Section 4.4.3.2 Investigation-Derived Waste, page 4-17	Revise text or provide missing standard operating procedure (SOP). The text states that, “The drums will be managed in accordance SOP-AP-05 (Attachment 1)”, but that SOP is not provided in Attachment 1.	The missing investigation-derived waste management SOP will be added to the FSP.
S20	FSP	Section 4.5.2 Test Pit Explorations, pages 4-18 through 4-19	Revise the text to clarify if the proposed physical testing is sufficient to inform slope stability evaluations under static and seismic conditions.	Additional details on geotechnical analyses and data collection will be added to the PDI work plan. Geotechnical data to support cap design will be collected in Phase 2 based on extents of sediments exceeding RALs or PTW identified in Phase 1. This will allow focused collection of geotechnical data as needed for dredge or cap design, including data necessary for seismic stability analysis. Geotechnical analysis of underlying materials to remain and capping material, including consolidation testing, bearing capacity, and shear strength, will be performed consistent with the guidance documents as needed for design. Note, the existing slurry wall and future groundwater levels will also need to be accounted for within the engineering design and geotechnical stability analysis.
S21	FSP	Section 4.7 Sediment Porewater, page 4-22	Porewater samples and the transition zone water samples (discussed in Section 4.6.3) should be analyzed for all ROD Table 17 COCs with groundwater CULs, ROD Table 21 focused COCs, and chlorobenzene.	Please see the response to work plan Comment S51.
S22	FSP	Section 6.2 Field Documentation Procedures, page 6-3	EPA’s ability to observe site conditions and oversee sampling may be limited by necessary health and safety precautions associated with the current COVID-19 pandemic. EPA requests that additional documentation be collected and provided to enable regulatory personnel to develop a near- first hand understanding of site conditions and field work. EPA is available to discuss the specifics of this request but conceptually this could consist of a standard set of photos showing each day’s sampling activities provided with a daily report of work activities (all conveyed in an email to EPA and its oversight contractor the following morning).	LSS will work with the EPA team to provide documentation to enable regulatory personnel to develop a near firsthand understanding of site conditions and fieldwork while protecting the health and safety of the staff.

Comment No.	Document	Section and/or Page No.	Comment	LSS Response
E1	FSP	Section 1.2 Conceptual Site Model, page 1-2	Reference the correct figure in the text. The figure indicated by the text, Figure 1-7 of the PDI WP, does not contain CSM information.	The FSP will be updated to reference Figure 1-9, which presents the conceptual site model diagram of the Dock 1 and 2 Reach.
G1	QAPP	General	The QAPP was reviewed versus the requirements in EPA Requirements for Quality Assurance Project Plans: EPA QA/R-5, March 2001, Reissued May 2006; and Guidance for Quality Assurance Project Plans: EPA QA/G-5, December 2002.	EPA QA/G-5 is referenced in the QAPP. QA/R-5 will be added as a reference to Section 1, Section 1.1.2, and Section 5 of the QAPP: USEPA. 2001. EPA Requirements for Quality Assurance Project Plans. EPA QA/R-5. EPA/240/B-01/003. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.
G2	QAPP	General	EPA R-5, QAPP guidance requires that the plan identify the individual responsible for maintaining the official, approved QA Project Plan. This information was not found in Appendix B; include this information in Section 1.1 of the QAPP.	Section 1.1.2 will be updated to reflect the Project QA Officer as the individual responsible for maintaining the official, approved QA Project Plan.
G3	QAPP	General	The signature page is unsigned. The Legacy Site Services and Integral Consulting, Inc. staff should sign all versions of the QAPP as evidence of review and approval of the document.	The Title and Approval Sheet will be fully signed in the QAPP.
S1	QAPP	Section 1.1, Project and Task Organization, page 1-1 through 1-4	The QAPP should provide the work schedule indicating critical project points, e.g., start and completion dates for activities such as sampling, analysis, data or file reviews, and assessments.	The schedule outlined in Section 6 of the work plan will be updated and included in Section 1.1 of the QAPP.
S2a	QAPP	Section 1.1.2, Key Task Personnel, page 1-2 through 1-3	EPA has the following comments on this section and the text should be revised accordingly: a. The descriptions of the key staff responsibilities are not clear with regard to quality. For example, the Principal in Charge, David Livermore; the Project/QA Manager, Eron Dodak; Principal Engineer, Rob Webb; and Project Geologist and Engineering Investigation/QA Manager, Tasya Gray all are stated to have QA responsibilities yet the responsibilities themselves are not clearly defined. Some roles actually conflict with the QAPP Guidance requirement for the QA manager to be independent of the work especially data generation aspects. Clarify the roles and break out who is responsible for implementing different components of quality.	The descriptions of the key staff responsibilities will be revised and clarified in regard to quality in the QAPP.
S2b	QAPP	Section 1.1.2, Key Task Personnel, page 1-2 through 1-3	b. The Project/QA Manager is shown here and on the Organization Chart as Eron Dodak of Integral. The PM can and should have quality related responsibilities but should not be the QA Manager. The QA Manager should be independent from the unit generating data and ideally report to top management to be independent and unbiased so that the objectivity and goals of the quality management system are maintained. List the QA Manager separately and describe their separate responsibilities.	An independent Project QA officer will be assigned with clear roles and responsibilities identified in this section of the QAPP.
S2c	QAPP	Section 1.1.2, Key Task Personnel, page 1-2 through 1-3	c. Tasya Gray is presented as the Project Geologist in this text and as the Engineering Investigation/QA Manager on the Organization Chart. Clarify the title to indicate the area of responsibilities as distinguished from other listed with QA responsibilities. See b.) above regarding expectations for the QA Manager.	Tasya Gray's title will be updated in Section 1.1.2 and the Project Organization chart to Engineering Investigation Manager.

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S3	QAPP	Section 2.4.1.4, PAHs, page 2-7	The text indicates that samples will be extracted using Soxhlet procedures but the associated Table B-3 shows sample extraction method as SW846-3546 using microwave extraction. Update the text accordingly.	The text in this section will be revised to reflect microwave extraction as noted on Table B-3.
S4	QAPP	Section 2.4.2.10, Geotechnical Parameters, page 2-9	The text indicates the methods to be used but the associated Table B-3 shows the methods as TBD. Update the table accordingly.	Table B-3 will be updated to reflect the geotechnical methods in the text.
S5	QAPP	Section 2.4.5.3, Dissolved Organic Carbon, page 2-12	The text indicates that DOC samples will be analyzed using method USEPA-9060A but the associated Table B-4 shows sample method APHA SM5310B. Update the text or table accordingly to clarify the procedure to be used for DOC.	Table B-4 will be updated to report the DOC method as EPA 9060A.
S6	QAPP	Section 2.4.6, Moisture Content, page 2-13	The text indicates that Moisture Content samples will be analyzed using method APHA SM-2540G but section 2.4.2.10, Geotechnical Parameters, page 2-9 and Section 2.4.4, Soil Sampling, on page 2-10 show the sample method as ASTM D-2216. Update the text sections and table to clarify the procedure to be used for Moisture Content.	Comment noted; No revisions required. The geotechnical laboratory uses a different method for moisture content than the chemistry laboratory.
S7	QAPP	Section 2.4.7, Analyses in Equipment Rinsate Blanks, page 2-13	Chloride analysis is not included in the text of the PDI WP, FSP or QAPP. Clarify why chloride will be analyzed for the equipment blank samples.	The work plan, FSP, and Section 2.4.5 of the QAPP will be updated to include the chloride analysis of the groundwater and porewater samples.
S8	QAPP	Section 2.5.1, Field Quality Control Samples, page 2-14	In the second paragraph clarify that these trip blank samples are for aqueous VOC samples. Section 2.5.2.1 on page 2-15 discusses trip blanks associated with soil/sediment samples. Note that the UFP-QAPP Manual describes the soil/sediment trip blanks as field blanks.	Section 2.5.1 will be updated to clarify these trip blanks are associated with aqueous samples.
S9	QAPP	Section 2.9, Non-Direct Measurements, page 2-16	Provide the acceptance criteria for the identified data sources and if there are any limitations (or none) for using these sources.	The acceptance criteria for the identified data sources will be 1) acceptable and usable data (i.e., data not rejected during validation) and 2) MDLs above the Portland Harbor RAL and PTW thresholds. Section 2.9 will be updated to include these criteria and any data limitations identified.
S10	QAPP	Section 4.2, Verification and Validation Methods, page 4-3	The first full paragraph states “MRL goals for this project will be determined prior to initiation of field activities”. The QAPP should document the method reporting limit (MRL) goals to evaluate the ability of the selected methods to achieve these goals. Clarify this statement and indicate why the MRLs are not included in the QAPP tables.	The QAPP tables will be updated to include the current laboratory MDLs and MRLs.
S11	QAPP	Table B-1	Expand this table to list each analyte being tested and not just the analyte groups. This information is needed to verify that all required ROD Table 21 and Table 17 contaminants are being characterized as appropriate for each media.	Table B-1 will be updated to report the target analyte lists for each group.
S12	QAPP	Table B-11, Summary of Samples and Analyses	Include trip blank samples on the table.	Table B-11 will be updated to include the estimated number of trip blanks.

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E1	QAPP	Section 1.3.2, Laboratory Analyses and Deliverables, page 1-10	The last sentence in this section says, “A list of data deliverables from the laboratories is provided in Section 1.5.2”, however section 1.5.2 does not exist in the QAPP. Revise the text to reference Section 1.6.2, Laboratory Documentation.	This sentence will be edited to reference Section 1.6.2.
E2	QAPP	Section 2.4.2.2, PCDD/Fs, page 2-8	Revise the text to remove the ‘6’ after the word “EPA”.	This sentence will be edited to remove the “‘6’” after “EPA.”
G1	HASP	General	The HASP and ERP appear to meet the minimum requirements under OSHA’s 29 CFR 1910 (specifically 1910.120) and 1926 standards, in addition to those for EPA Emergency Response.	Comment noted.
G2	HASP	General	**Asbestos**: Provide rationale for not including an evaluation of hazards or safeguards for exposure to asbestos in the project area HASP. Site background information describes disposal of asbestos concerning material in asbestos trenches and ponds on Lots 1 and 2 and asbestos has been detected in sediment samples collected at the project area. Considering one of the objectives of the river bank sampling is to evaluate asbestos in the river bank and that sampling will be included test pit excavations and drilling, exposure to asbestos should be considered in activity hazard analysis for sampling and sample processing.	The HASP will be updated to monitor for asbestos particles in air while sampling on the riverbanks. Asbestos monitoring is not necessary for sediment sampling because the sediment will be handled while it is wet.
S1	HASP	Section 1.4.2 Federal, page 1-10	It is assumed compliance with 29 CFR 1910.120 is implied but suggest stating such.	That is correct. The HASP will be updated to explicitly state that the work will comply with 29 CFR 1910.120.
S2	HASP	Section 6.10.1.3 Action Levels, page 6-12	The table has action level of 1 ppm for benzene with Drager tube; consider a 0.5 ppm action level to align with standard one-half of Permissible Exposure Limit practice.	LSS agrees with this change and will update the HASP accordingly.
S3	HASP	Section 6.14.3 Foot Protection, page 6-18	EPA encourages the use of **c**hemical-protective footwear by all personnel during all field activities to facilitate decontamination; alternatively boot covers that cover the foot and approved footwear may be worn as noted.	Comment noted. The use of chemical-protective footwear will be added to the HASP.
S4	HASP	Section 6.14.12 Safety Equipment, pages 6-22 through 6-23	Text should be added that an automated external defibrillator (AED) will be accessible at each work site, confirmation it will be in an unlocked location, and procedures on use will be available. Language that emergency equipment will be checked daily to ensure its readiness for use should also be included; for example, “The AED will be checked for a flashing hour glass/absence of the low battery alarm on a daily basis”.	The requested text regarding the AED will be added to the HASP.
S5	HASP	Section 9.8 Working at Height & Fall Protection	The reference to fall exposure at 6 feet throughout should be changed to 4 feet due to General Industry Standard.	This change will be made to the HASP globally.

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S6	HASP	Appendix K, Job Hazard Analyses (JHAs), General	COVID-19 should be listed as a hazard across all tasks, with listing of hygiene/distancing protocol, or reference to protocol. Face coverings should be encouraged during most activities. The JHA's should also be updated with the most up to date State of Oregon COVID-19 guidance prior to start of the field activities.	The requested changes will be made to the HASP. The JHAs will be updated to include the most up-to-date State of Oregon COVID-19 guidance prior to fieldwork and will be updated throughout the fieldwork as new guidelines are issued by the State.
S7	HASP	Appendix U, COVID-19 Field Program Management Plan	The symptom list on page 2 should be expanded per latest Centers for Disease Control and Prevention (CDC) information. The symptom list should apply to the 3rd bullet on page. 6 describing when to stay home from symptoms. Consider adding return to work guidance to Appendix U also.	These changes will be made to Appendix U of the HASP.
S8	HASP	Appendix U, COVID-19 Field Program Management Plan, Discontinuation of Home Isolation, page 10	The 2nd bullet listing "…7 days…" since the onset of symptoms should be changed to 10 days per CDC guidance. Similarly, update last paragraph to read "…may discontinue home isolation when at least 10 days have passed since the outcome…"	This change will be made to Appendix U.
E1	HASP	Section 6.14.9 Personal Flotation Devices and Rescue, page 6-21	This section is repeated on page 6-23 in Section 6.14.13.	The duplicate section will be removed from the HASP to avoid confusion.
E2	HASP	Section 12 Emergency Response Plan, page 12-1 through 12-10	Information contained is very similar to that in Appendix D – Emergency Response Plan. The two appendices could be combined, or perhaps one can reference the other so that they align.	Section 12 of the HASP will reference the Emergency Response Plan (Appendix D) so they are in alignment.